

Taxonomy and Natural History of the Funnel-Web Spider Genus *Macrothele* (Araneae: Hexathelidae: Macrothelinae) in the Ryukyu Islands (Japan) and Taiwan

Matsuei Shimojana¹ and Joachim Haupt^{2,*}

¹*Department of Education, University of the Ryukyus, Nishihara 903-0129, Okinawa, Japan*

²*Tropical Biosphere Research Center (Iriomote Station), University of the Ryukyus, 870
Uehara, Taketomi-cho 907-1541, Okinawa, Japan*

(Received 31 March 1997; Accepted 3 September 1997)

The distribution of the funnel-web spider genus *Macrothele* was studied in the Ryukyu Islands and northern Taiwan. Six species are recognized, three of which are only known from Taiwan (*Macrothele holsti* Pocock, 1901, *M. simplicata* (Saito, 1933), and *M. taiwanensis* sp. n.). Three new species are described from Amami-ōshima and Tokunoshima in the northern Ryukyus (*M. amamiensis* sp. n.) and from Ishigaki and Iriomote of the Yaeyama Islands (*M. yaginumai* sp. n. and *M. gigas* sp. n.).

Key Words: Araneae, Hexathelidae, *Macrothele*, Ryukyu Islands, Taiwan, Taxonomy.

Introduction

In recent years new species of funnel-web spiders of the genus *Macrothele* have been described from China (Zhu and Mao 1983; Hu and Li 1986), but knowledge about this genus is still incomplete.

The variability of external characters such as cheliceral dentation and distribution of spines in many mygalomorph spiders makes it indispensable to study the male palpal organs and the female receptacula for taxonomic purposes. Adult males are short-lived, but in contrast to females, which stay more or less inaccessible in their funnel webs under logs and rocks, they roam around in search of a suitable female. Although the males are nocturnal and prefer moist nights after rain, this offers a chance for collection. Another possibility is to rear juvenile specimens until they become adult.

In light of these difficulties it is not surprising that the accumulation of sufficient material from different islands requires many years. The results of such field collections of the genus *Macrothele* are presented here, including the description of four new species. These are compared to two related species in the area, one of which is redescribed. Unfortunately, no new material could be acquired of the taiwanese Hira-jōgogumo *Macrothele simplicata* (Saito, 1933).

Material and Methods

Morphological studies were completed with a Wild M3 stereoscopic microscope

* Address for correspondence: *Institut für Ökologie und Biologie, TUB, FR 1-1, Franklinstr. 28/29, D-10587 Berlin, Germany*

equipped with a drawing device.

Reference specimens are deposited in the collections of the National Science Museum, Tokyo, Zoologisches Museum der Humboldt Universität zu Berlin, the Musée d'Histoire Naturelle de Genève, and the Natural History Museum, London.

Abbreviations used in the text:

BMNH: The Natural History Museum, London

MHNG: Musée d'Histoire Naturelle, Genève

NSMT: National Science Museum, Tokyo

ZMB: Zoologisches Museum der Humboldt Universität zu Berlin

Descriptions of Species

Macrothele holsti Pocock, 1901

Japanese name: Horusuto-jōgogumo

(Figs 1-2, 11, 21-22)

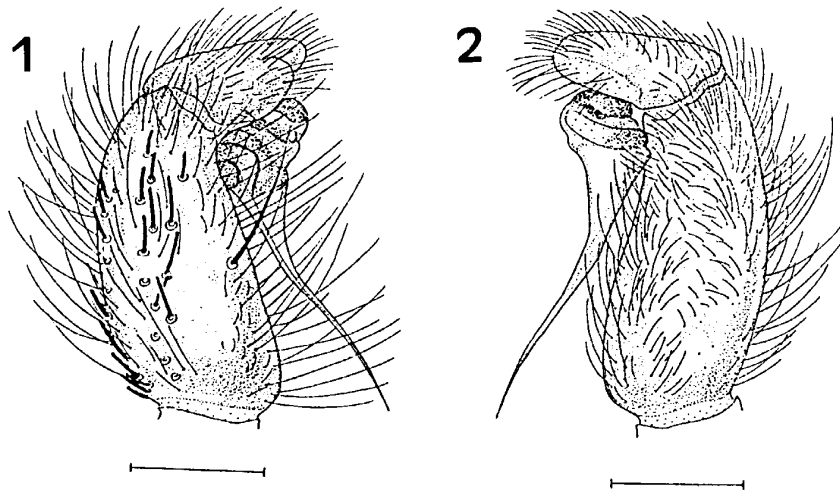
Material examined: male (holotype by original designation) and female, Lake Ku-li, central Formosa [Taiwan], 1894-12-20, P.A. Holst coll. (BMNH).

Diagnosis: Quite hairy species, about 14mm long, with stout, blunt spines of typical shape on prolateral side of male pedipalpal tibia. Female receptacula tubular, slightly bent laterally, with ovular terminal part.

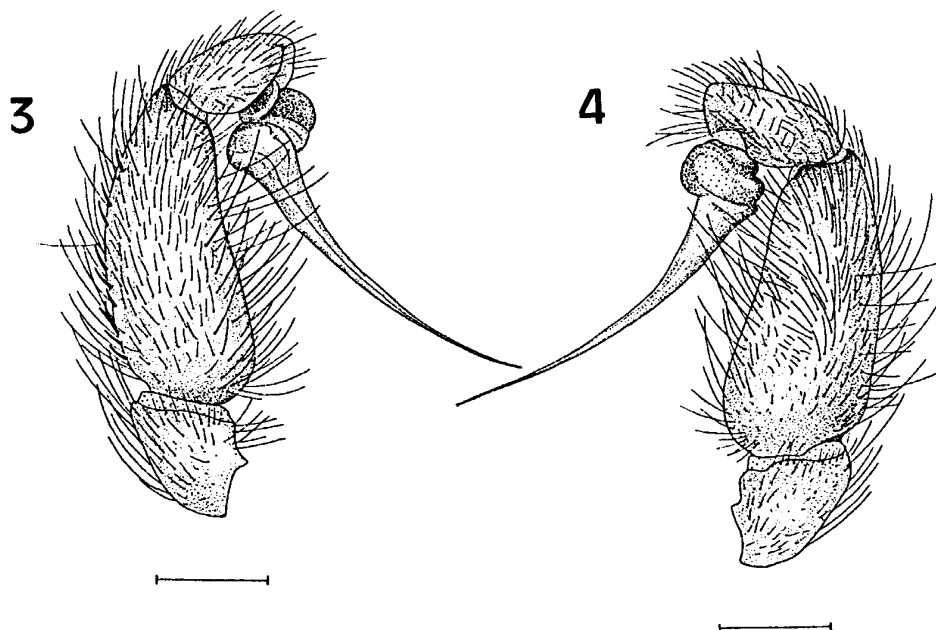
Redescription: Middle-sized, quite hairy spider of (in alcohol) brown colour with lighter opisthosoma showing five pairs of darker oblique, transverse bands extending from a darker dorsomedian line. Fovea formed as transverse pit, in male almost circular. Basal article of chelicerae with numerous long hairs at distal end.

Male. Total length 14mm, carapace 6.5mm long, 5.7mm broad. Basal article of chelicerae with only short, minor depression on dorsal side.

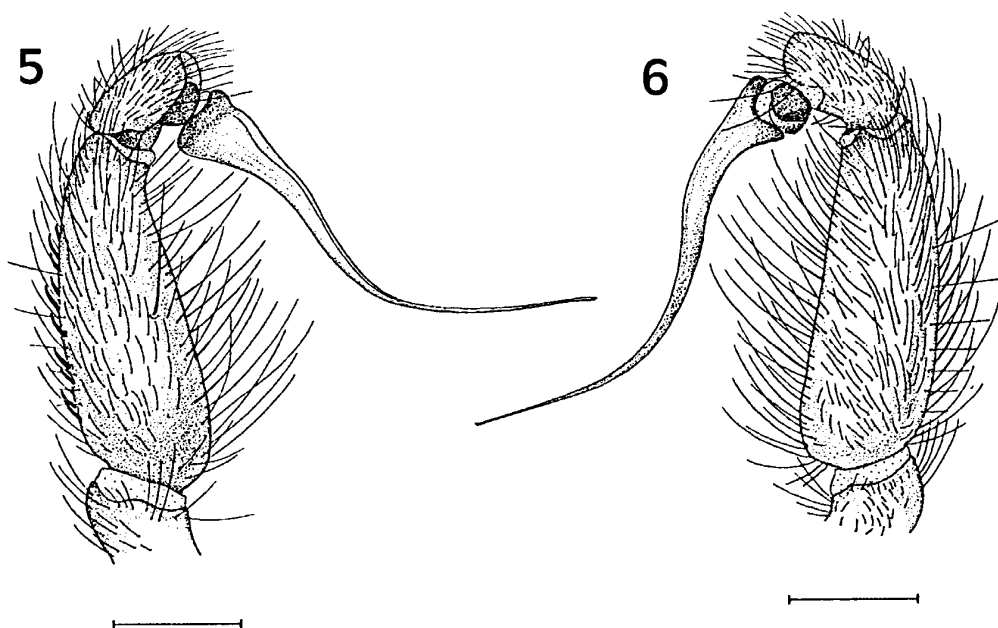
Pedipalp (Figs 1-2,11): Tibia with about 14 stout, blunt spines in irregular double



Figs 1, 2. Left male pedipalp of *Macrothele holsti* with palpal organ in prolateral (1) and retrolateral view (2). Bars 1mm.



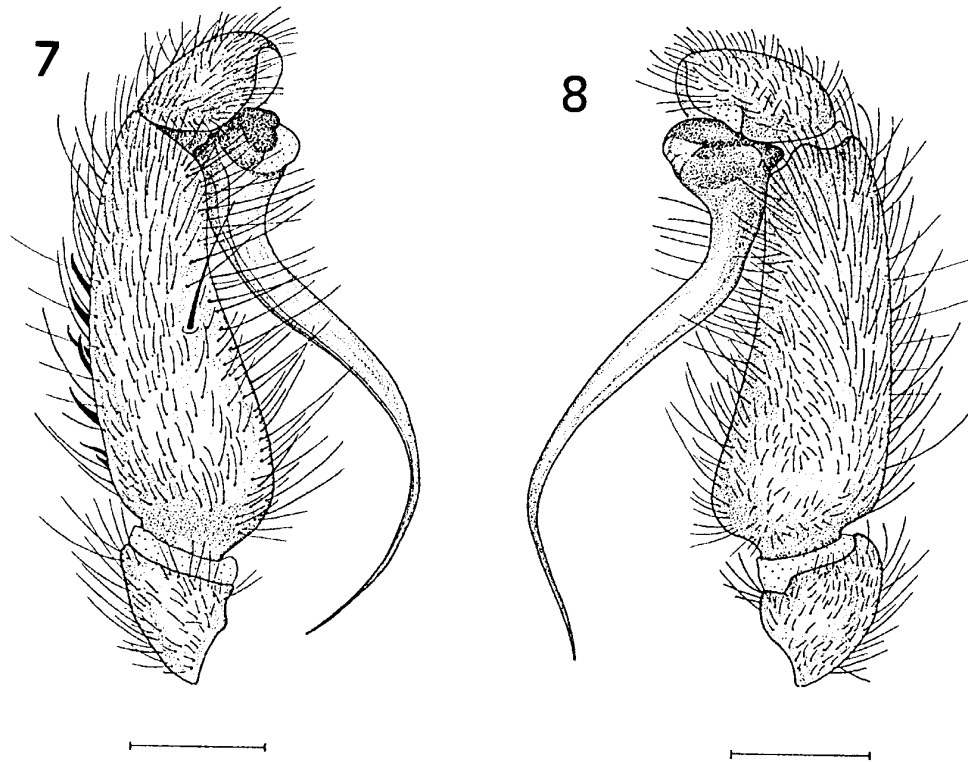
Figs 3, 4. Left male pedipalp of *Macrothele amamiensis* sp. n. with palpal organ in prolateral (3) and retrolateral view (4). Bars 1mm.



Figs 5, 6. Left male pedipalp of *Macrothele taiwanensis* sp. n. with palpal organ in prolateral (5) and retrolateral view (6). Bars 1mm.

row on prolateral side, one long median bristle on ventral side. Dorsal side with single curved row of 14 (13 on right side) stout, blunt spines, flanked on each side by row of trichobothria with hair length increasing in distal direction. Retrolateral side devoid of bristles, but with long hairs close to dorsal and ventral sides.

Palpal organ: Bulb above subtegulum steeply conical, ending in long, slender,



Figs 7, 8. Left male pedipalp of *Macrothele yaginumai* sp. n. with palpal organ in prolateral (7) and retrolateral view (8). Bars 1mm.

slightly and evenly curved embolus with straight distal part. Embolus in normal position slightly overreaching proximal end of tibia (Figs 1, 2).

Leg 1: Metatarsus with double row of four (+ one) bristles on ventral side, tibia with row of four long, strong bristles on ventral side, these flanked by row of four bristles retrolaterally and row of two bristles prolaterally. On prolateral side four oblique rows of bristles.

Leg 2: Tibia with five bristles (one basal, one median, three apical) on ventral side, one median and one apical bristle on prolateral side. Metatarsus and tarsus missing.

Sternal sigilla: Three pairs, including very small ones opposing first leg, small oval ones opposing second leg and large oval ones between legs 3 and 4.

Female: Colour as male, carapace 5.8mm long, 4.7mm broad, opisthosoma 8.3mm long. Initial part of receptacula oval and connected to vulva by slightly laterally bent tube (Fig. 21). In subadult stage, bending of tube more pronounced, resulting in semicircle (Fig. 22). Except for terminal portion, most of tubule covered by glandular pores (Fig. 21).

Remarks: Pocock (1901) mentioned two subadult females in his description. One of these was accessible for study. Fortunately, this specimen was in the preparatory phase of its maturational ecdysis. Consequently, the receptacula of the adult stage are already visible beside the receptacula of the subadult stage.

***Macrothele gigas* sp. n.**

Japanese name: Okurokebuka-jōgogumo

(Figs 9-10, 15, 20)

Material examined: Male holotype. Type locality: Funaura, Iriomote, 1995-4-28, S.S. Haupt coll. Paratypes: female, Omoto-dake, Ishigaki, 1967-12-30, M. Shimojana coll.; female, Ōtomi, Iriomote, 1995-11-26, M. Shimojana coll.; male and two females, Funaura, Iriomote, 1996-4-11, J. Haupt coll.

Type depository: ZMB (30760); paratypes: BMNH, MHNG, NSMT.

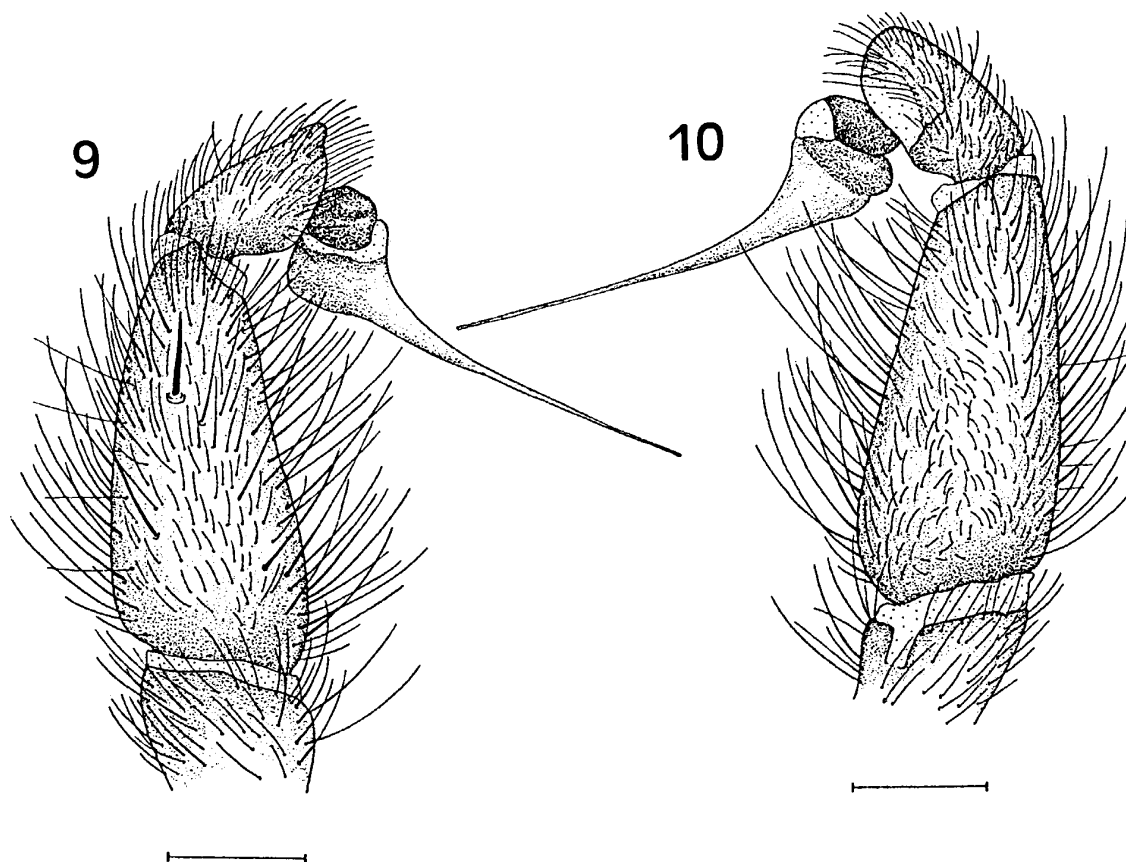
Etymology: γίγας (greek) big.

Diagnosis: Big, black, very hairy species (about 16-26mm long). Chelicerae reddish brown. Embolus almost straight, pedipalpal tibia lacking dorsal row of spines, tubular part of female receptacula strongly bent laterally. Distance between anterior spinnerets shorter than length of one anterior spinneret.

Description: Species with long, black hairs all over the body and its appendages. Carapace brownish black, chelicerae reddish brown, fovea in form of transverse, straight furrow. Opisthosoma black. Body length 16-26mm, carapace 7-13mm.

Male: Carapace 7.7mm long, 6.6mm broad, opisthosoma 9.2mm long. Basal article of chelicerae with short, minor, unmodified basal depression on dorsal side.

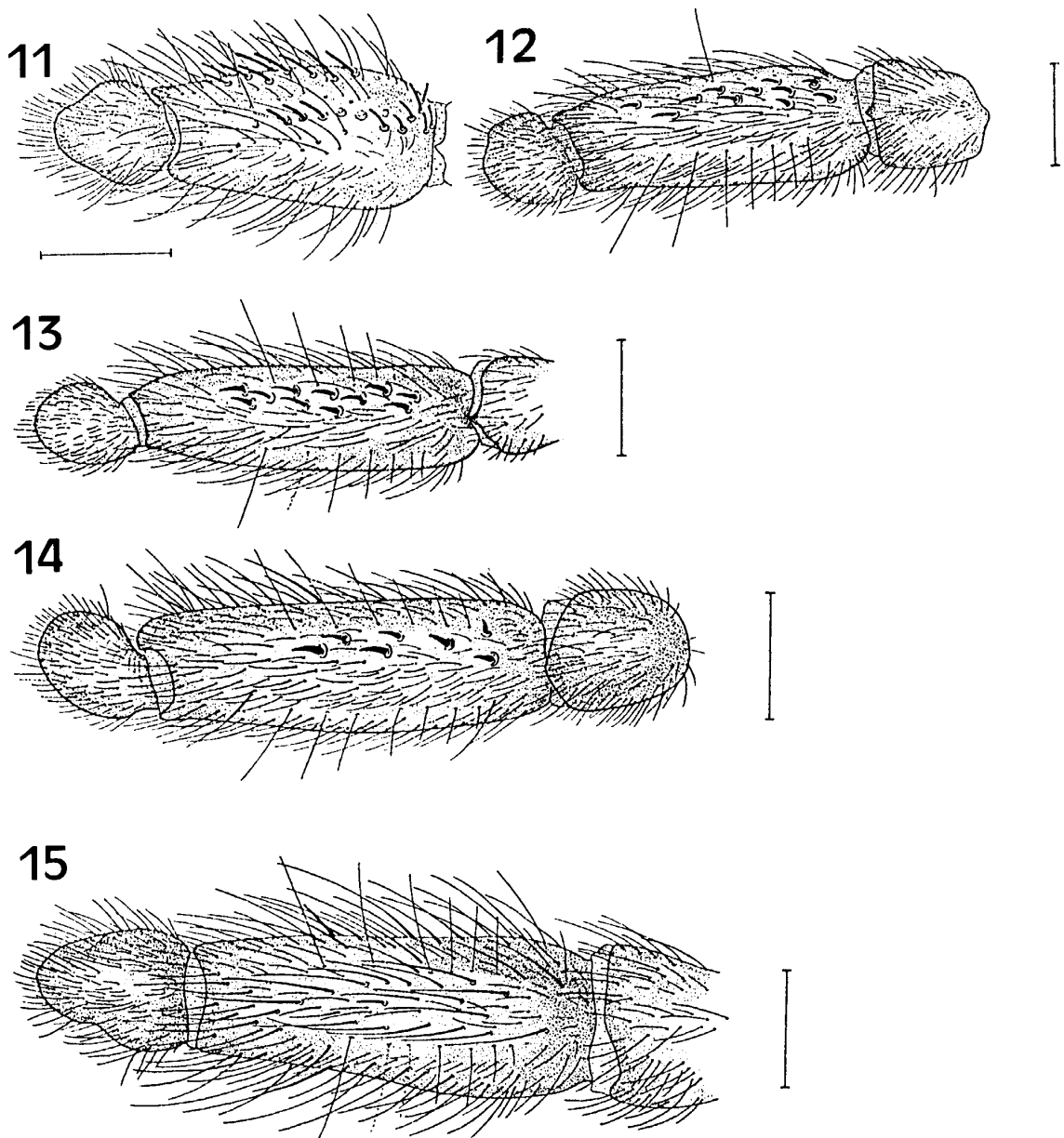
Pedipalp (Figs 9, 10, 15): Tibia with one ventromedian long bristle on prolateral



Figs 9, 10. Left male pedipalp of *Macrothele gigas* with palpal organ in prolateral (9) and retrolateral view (10). Bars 1mm.

side (Fig. 9), one dorsal bristle more distally. Dorsal side (Fig. 15) with comb of long hairs but no spines, bordered on both sides by stripes devoid of usual sensory hairs, but set with trichobothria, hair length of latter increasing in distal direction. Ventral side with long, tapered hairs. Retrolateral side with weaker hairs (Fig. 10). Palpal organ almost triangular in lateral view (Figs 9, 10), embolus almost straight. Length of palpal organ not exceeding length of tibia.

Leg I: Tarsus with double row of 12-13 bristles. Metatarsus with median row of seven bristles on ventral side, apical row of three bristles more prolaterally, and row of five bristles more retrolaterally. Ventral side of tibia with numerous, irregular



Figs 11-15. Left male pedipalps in dorsal view: 11, *Macrothele holsti*; 12, *M. amamiensis* sp. n.; 13, *M. taiwanensis* sp. n.; 14, *M. yaginumai* sp. n.; 15, *M. gigas* sp. n. Bars 1mm.

positioned bristles. Patella with strong bristles on retrolateral side ventrodistally.

Leg 2: Tarsus with two rows of 12-13 bristles each on ventral side, metatarsus with median row of four bristles on ventral side, one apical bristle more prolaterally, one ventromedian bristle, and row of five bristles more retrolaterally. Tibia with row of six bristles on ventral side and proximal group of seven (of which two are basal bristles of median row). Metatarsus without basal excavation.

Sternal sigilla: Two pairs, including small round ones opposing second legs and large ovoid ones with rounded sides pointing mediad, in opposition to third pair of legs.

Female. Larger than male (prosoma 9.6mm long, 8.6mm broad, opisthosoma 14mm long). All tarsi with two rows of spines on ventral side, metatarsi with irregularly positioned bristles on ventral side. Receptacula with oval terminal portion (Fig. 20) leading into tube strongly bent laterally with anterior end bent medially. Tube forms funnel-shaped part at vulva.

Sternal sigilla: Two pairs of elongate oval shape, small ones opposing second legs, larger ones opposing legs 3 and 4.

Remarks: In Japanese literature, including Ikehara and Shimojana (1975) and Yaginuma (1986), this species has often been referred to as *M. holsti*. Males are adult in late April. Normally they are active at night, but on rainy days they can be found in the woods, even in daytime.

***Macrothele taiwanensis* sp. n.**

Japanese name: Kirun-jōgogumo

(Figs 5-6, 13, 16, 23)

Material examined: male holotype, female allotype. Type locality: Chi-lung [Keelung], Taiwan, 1982-12-28, M. Shimojana coll.

Type depository: ZMB (30671, 30672).

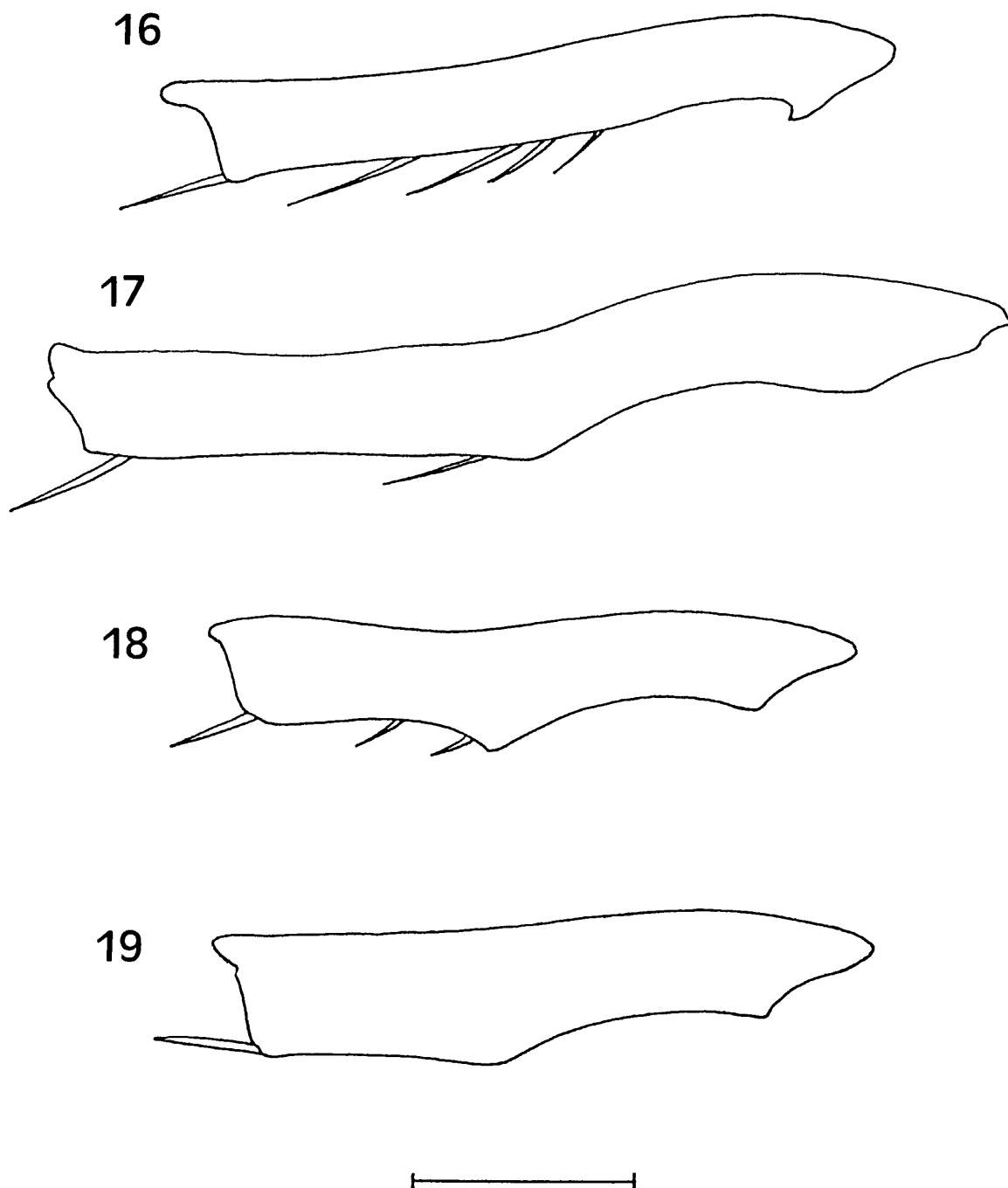
Etymology: Named after the island Taiwan.

Diagnosis: Funnel-web spider with second pair of opercula monochrome dark, female receptacula tubular, in shape of ram's horns, opisthosoma in anterior part with strong dorsomedian dark line. Male with strongly S-shaped embolus, metatarsus of first leg with ventral row of about eight bristles, metatarsus of second leg excavate on ventral side.

Description: Carapace black to brownish black, in alcohol brownish, distal article of posterior spinnerets yellowish white. Basal article of chelicerae with long terminal hairs. Fovea as transverse pit, broader than in *M. yaginumai* sp. n. Opisthosoma monochrome, brownish black, in alcohol slightly purple, in female with dorsomedian dark line reaching from anterior to middle.

Male (holotype): Body length: 9.4mm (carapace 4.3mm long, 3.8mm broad, opisthosoma 5.1mm long). Basal article of chelicerae with long dorsal depression marked by transverse grooves.

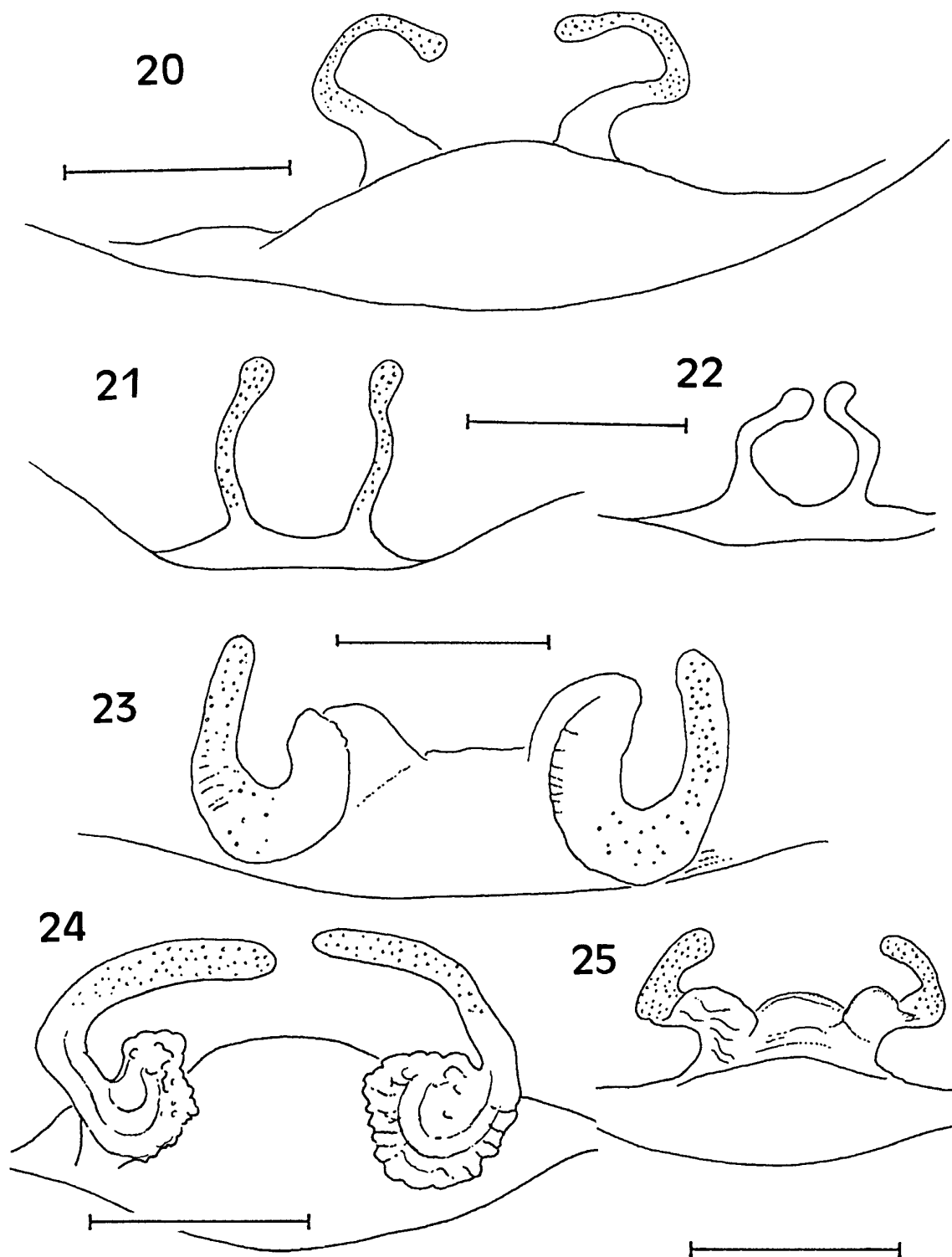
Pedipalp (Figs 5, 6, 13): Tibia with 11-13 short, conical, acute bristles on dorsal side (tips bent ventrally) in two irregular, longitudinal rows (Fig. 13), flanked by row of trichobothria on each side, hairs of latter increasing in length distally. Ventral side of tibia with long hairs, prolateral side with long bristle in median position (Fig. 5). Retrolateral side devoid of bristles, even lacking hairs in median part (Fig. 6).



Figs 16-19. Left metatarsus of male second leg in retrolateral view (16, *Macrothele taiwanensis* sp. n.; 17, *M. yaginumai* sp. n.; 18 and 19, *M. amamiensis* sp. n. from Tokunoshima (18) and Amami-oshima (19)). Bar 1mm.

Embolus of palpal organ long and strongly curved into S-shape (Figs 5, 6), with sharp ridge making lengthy longitudinal spiral.

Leg 1: Tarsus with double row of four to six bristles on ventral side. Metatarsus with median row of eight ventral bristles, row of five bristles more prolaterally;



Figs 20-25. Female receptacula: 20, *Macrothele gigas* sp. n.; 21, *M. holsti*; 22, *M. holsti* (same specimen subadult); 23, *M. taiwanensis* sp. n.; 24, *M. yaginumai* sp. n.; 25, *M. amamiensis* sp. n. Bars 1mm.

median oblique row of three bristles; and, more retrolaterally, row of two bristles more proximally, one bristle more distally and one apical bristle. Tibia with row of four bristles on ventral side, two apical bristles more prolaterally and one median bristle more retrolaterally.

Leg 2: Tarsus with two rows of four bristles on ventral side, metatarsus with one subbasal bristle on ventral side, three bristles more retrolaterally, one apical bristle more prolaterally and one median prolateral bristle. Metatarsus lacking basal excavation on ventral side (Fig. 16). Tibia with two very strong bristles on ventral side, situated side by side like a fork; row of three bristles more proximally. One retrolateral median bristle, and on prolateral side one apical as well as one subapical, almost median bristle.

Female (allotype): Body length 16.7mm (carapace 6.5mm long, 5.0mm broad, opisthosoma 10.2mm long).

Sternal sigilla: Two pairs: ovoid small ones opposing second legs, larger ones opposing legs 3 and 4.

Metatarsus 1: Four ventral bristles on retrolateral side, two bristles on prolateral side.

Receptaculum: Tubular in shape, strongly curved in dorsal direction, turning posteriorly and then again in latero-anterior direction. About half of tube covered by glandular pores (Fig. 23).

***Macrothele amamiensis* sp. n.**

Japanese name: Amami-jōgogumo
(Figs 3-4, 12, 18, 19, 25)

Material studied: male holotype, female allotype: 1982-1-30, M. Shimojana coll. Type locality: Naze, Amami-ōshima. Paratypes: four males, two females, Naze, Amami-ōshima, 1982-1-30, M. Shimojana coll.; one male, Tatsugo-mura, Amami-ōshima, 1982-2-4, M. Shimojana coll.; one male, Fukusato, Amami-ōshima, 1983-12-18, M. Shimojana coll.; one male, Sumiyo-mura, Amami-ōshima, 1975-12-28, M. Shimojana coll.; one male, Takabachi-yama, Amami-ōshima, 1983-12-15, M. Shimojana coll.; one male, Nishinakama, Amami-ōshima, 1983-12-16, M. Shimojana coll.; four males, two females, Amagi-dake, Tokunoshima, 1982-1-31, M. Shimojana coll.

Type depository: NSMT; paratypes: MHNG, ZMB (30673, 30674).

Etymology: Named after the island Amami-ōshima.

Diagnosis: Funnel-web spider with second pair of opercula light with dark spots. Female with tubular receptacula in shape of ram's horns. Male with evenly curved embolus, metatarsus of second leg not excavate on ventral side.

Description: Living specimens black, slightly purple; maxillae, labium, and opercula light yellowish, margin of maxillae brownish; legs, sternum, and pedipalps dark brown, spinnerets slightly lighter, anterior spinnerets light yellowish. In alcohol carapace brown, opisthosoma dark greyish with dorsomedian dark line forming lateral segmental extensions, ventral side dark with irregular light spots. Second pair of opercula light with dark spots.

Male: Body length 11.2mm (carapace 5.2mm long, 4.2mm broad, opisthosoma 6.0mm long). Basal article of chelicerae with dorsal depression in basal position,

grooves lacking.

Pedipalp (Figs 3, 4, 12): Tibia with eight or nine (variation in other specimens 7-12) very short, conical bristles on dorsal side, their tips slightly bent ventrally (Figs 3, 12). These bristles flanked by two rows of trichobothria, with hairs increasing in length distally. Palpal organ slightly longer than tibia. Embolus evenly curved with sharp longitudinal ridge in long spiral (Figs 3, 4).

Leg 1: Tarsus with double row of small, reduced bristles (2+1). Metatarsus with two apical bristles on ventral side, and ventral row of three + one bristles; more prolaterally row of four bristles (+ one more proximal basal bristle); more retrolaterally two rows of three bristles (second row + one bristle more retrolaterally). Two bristles (median and subbasal) on retrolateral side, and two bristles (median and subbasal) on prolateral side. Tibia with two apical bristles on ventral side, row of four bristles more retrolaterally (+ two in even more retrolateral position), row of three bristles prolaterally, and two bristles (median and subbasal) retrolaterally.

Leg 2: Tarsus with two rows of two small bristles, metatarsus with two ventro-apical and one prolateral bristle in median position. This set of ventral bristles quite variable. Metatarsus distinctly excavated in basal part of ventral side (Figs 18-19). Number of ventral postmedian bristles variable (0-2), one terminal bristle on ventral side. Tibia with single ventral row of three or four bristles, and one basal and one subbasal bristle more retrolaterally.

Female. Body length: 16.7mm (carapace 7.0mm long, 4.9mm broad, opisthosoma 9.7mm long). Receptaculum tubular, bending dorsad and turning laterad and then anteriorly mediad. About half of tube covered by glandular pores (Fig. 25). Sternal sigilla in three oval pairs, opposing legs 1, 2, and 3/4.

Remarks. There are previous reports of Hexathelids (formerly Dipluridae) from Amami-ōshima by Kayashima (1955: *Euagrus formosanus* Saito, 1933) and Ono and Yaginuma (1964: *Macrothele* sp.). Contrary to Ono and Yaginuma (1964), the report of *E. formosanus* is now interpreted as a misidentification (H. Ono, personal communication).

***Macrothele yaginumai* sp. n.**

Japanese name: Yaeyama-jōgogumo
(Figs 7-8, 14, 17, 24)

Material examined: male holotype, female allotype. Type locality: Ōtomi, Iriomote, 1995-11-26, M. Shimojana coll. Paratypes: 1 male, 2 females, Omoto-dake, Ishigaki, 1973-3-23, M. Shimojana coll.; one male, 1973-7-9, M. Shimojana coll.; one male, one female, Arakawa forest, Ishigaki, 1984-2-20, M. Shimojana coll.; one male, one female, Fukubuku Cave (at entrance), Ishigaki, 1986-11-29, M. Shimojana coll.; one male, Tomino, Ishigaki, 1984-2-19, M. Shimojana coll.; two males, one female Ōtomi, Iriomote, 1995-11-26, M. Shimojana coll.; one male, Shirahama, Iriomote, 1965-8-7, M. Shimojana coll.; one male (adult in 1997-1), one female, Funaura, Iriomote, 1996-4-25, J. Haupt coll.

Type depository: NSMT; paratypes: BMNH, MHNG, ZMB (30675, 30676).

Etymology: Named in memory of Prof. Takeo Yaginuma.

Diagnosis: Funnel-web spider with anterior part of opisthosoma monochrome,

posterior part with median dark line forming lateral segmental extensions. Female receptacula tubular, strongly bent in direction of median line. Male with embolus strongly S-shaped, metatarsus of first leg with ventral row of about four bristles, metatarsus of second leg strongly excavate on ventral side.

Description: Colour in both sexes black, slightly purple, in alcohol black to brownish black, opisthosoma with lighter colour and dark median longitudinal stripe with segmental dark lateral lines. Maxillae, labium, and opercula light yellowish, legs, sternum and pedipalps dark brown, spinnerets slightly lighter, anterior spinnerets even light yellowish.

Male (holotype): Body length: 13.0mm (carapace 6.0mm long, 5.2mm broad, opisthosoma 7.0mm long). Fovea transverse, slit-like. Basal article of chelicerae with long dorsal depression characterized by numerous fine, transverse grooves and ridges. Second such area with grooves and ridges in more lateral position. Distal part of cheliceral basal article with numerous short hairs accompanied by a few long hairs.

Pedipalp (Figs 7, 8, 14): Tibia with 8-9 (in other specimens 6-16) short conical bristles on dorsal side, arranged in irregular row of ones and twos, flanked by row of trichobothria on each side, hair length of latter increasing distally. Palpal organ with long, strongly curved, S-shaped embolus, laterally depressed in basal half (Figs 7-8) and reaching well beyond proximal end of tibia.

Leg 1: Tarsus with two rows of three to four bristles. Metatarsus with ventral row of four bristles, row of four bristles more prolaterally, row of 4 bristles more retrolaterally (+ two bristles even more retrolaterally). Tibia with two apical bristles on ventral side, ventral row of four bristles more retrolaterally, and two bristles in subapical and median positions on prolateral side.

Leg 2: Tarsus with two rows of three bristles on ventral side. Metatarsus with one prolateral and two apical bristles. Metatarsus excavated in proximal part of ventral side (Fig. 17), with zero to two postmedian ventral bristles and one terminal ventral bristle. Tibia with ventral row of four strong bristles (+one in more retrolateral position). Prolateral side with row of three bristles.

Sternal sigilla: one oval pair opposing third legs.

Female (allotype): Body length 19.7mm (carapace 7.9mm long, 6.1mm broad, opisthosoma 11.8mm long). Receptaculum tubular, U-shaped at vulva, turning anterior and bending in mediad direction, less than half of tube covered by glandular pores (Fig. 24). Sternal sigilla in two pairs, small ones opposing legs 2, larger oval sigilla opposing legs 3/4.

Discussion

Because the preferred habitats of East Asian hexathelid species are cavities between the roots of old trees, broken tree trunks, or cavities under rocks, all species are limited to wooded areas, with a strong preference for old forests.

The study of the type material of *Macrothele holsti* from Taiwan showed that this species is not identical with any species occurring in the Ryukyus. In 1933 Saito described *M. simplicata* from a single female. According to its size and hairy appearance it cannot be confused neither with *M. holsti* nor with *M. taiwanensis* sp. n.

Besides these taiwanese species there are three others that occur in the Yaeyama

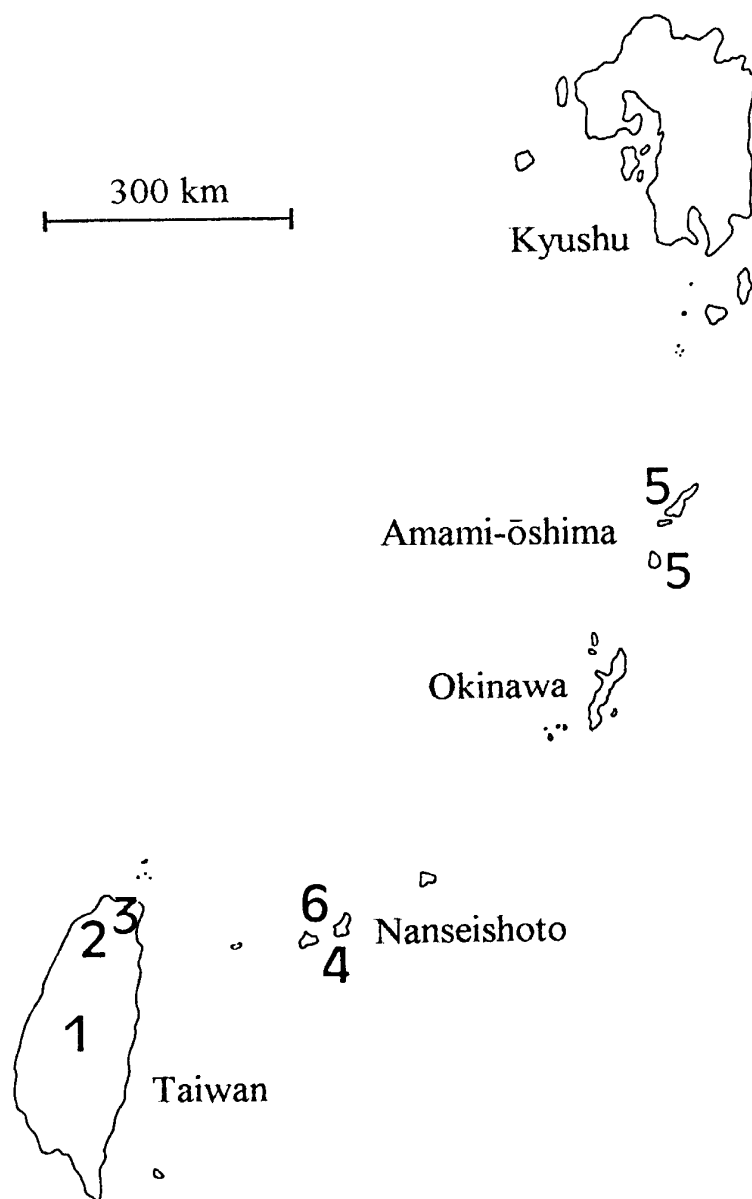


Fig. 26. Distribution of *Macrothele* species in Taiwan and the Ryukyu Islands according to the present state of knowledge: 1, *M. holsti*; 2, *M. simplicata*; 3, *M. taiwanensis* sp. n.; 4, *M. yaginumai* sp. n.; 5, *M. amamiensis* sp. n., 6 *M. gigas* sp. n.

Islands, and in Amami-ōshima and Tokunoshima. Compared to *M. gigas* sp. n., the two other Ryukyuan species are considerably smaller and their males are characterized by a specific set of differentiated bristles on the dorsal side of the pedipalpal tibia. Males of *M. holsti* have an additional prolateral row of specialized bristles. In this species such bristles are long and blunt, much different from what we find in the new species, and the female receptacula are also entirely different.

The specialized bristles on the male pedipalps must be considered as subject to sexual dimorphism. They may play some role during courtship. The diverse

pedipalpal morphology of the males (specialized bristles, shape of embolus), as well as differences in the ventral bristle pattern, especially of the metatarsus and tibia of the first two legs, are the main arguments for considering these island populations as separate species. Similarities in the morphology of the female receptacula give evidence for a close relationship between *M. taiwanensis*, *M. yaginumai*, and *M. amamiensis*. As a result of the isolation of island populations since the Pleistocene, we may consider these three new species as sibling species derived from a previously widely distributed one. The corresponding species from the Asian continent, which was described from Ningbo (Zhejiang Province), is *M. palpator* Pocock, 1901. *Macrothele* specimens from Okinawa itself still represent a missing link.

The female receptacula of *Macrothele holsti* (Fig. 21) are distinctly different from those of the newly described species, but the mating season during winter coincides with that of *M. taiwanensis* sp. n., *M. yaginumai* sp. n., and *M. amamiensis* sp. n., although occasionally adult males have been found already in August. The mating season of *M. gigas* sp.n. is during spring (April).

It should not be puzzling that female receptacula exhibit a relatively broad variation. We have to remember that females of *Macrothele*, like other mygalomorph and mesothele spiders (Haupt 1983, 1991), continue moulting as adults, and therefore greater variation in the form of receptacula must be expected, when compared to receptacula variation in araneomorph spiders. A striking example of variation between successive instars of the same specimen is demonstrated by the female of *Macrothele holsti* (Figs 21-22).

The present knowledge of the distribution of *Macrothele* species in the region is summarized in Fig. 26.

Key to the Species of *Macrothele* of the Ryukyu Islands and Taiwan

- Males1
- Females5
- 1 Big, black, hairy species with reddish chelicerae, occurring in the Yaeyama islands. Pedipalpal tibia without dorsal row of spines. Prosoma 7.0-10.0mm*M. gigas*
- 1* Smaller species, less hairy 2
- 2 Embolus S-shaped3
- 2* Embolus curved evenly, metatarsus of second leg not excavate on ventral side*M. amamiensis*
- 3 Dorsal spines of pedipalpal tibia blunt, embolus slightly S-shaped, metatarsus of second leg without ventral excavation*M. holsti*
- 3* Pedipalpal tibia with conical, acute spines, embolus more strongly S-shaped, metatarsus of second leg with ventral excavation4
- 4 Metatarsus of fist leg with ventral row of about eight bristles*M. taiwanensis*
- 4* Metatarsus of first leg with ventral row of about four bristles*M. yaginumai*
- 5 Big, black, hairy species9
- 5* Smaller species, less hairy6
- 6 Receptaculum with ovular initial part connected to vulva by tube slightly bent in lateral direction*M. holsti*
- 6* Initial part of receptacula not globular, ovular or oval7

- 7 Receptacula in shape of ram's horn8
 7* Tubular parts of receptacula strongly bent in median direction ...*M. yaginumai*
 8 Dorsal side of opisthosoma with strong dark median line in anterior part, second pair of opercula monochrome dark*M. taiwanensis*
 8* Opisthosoma with dorsomedian line forming lateral segmental extensions also in the anterior part, second pair of opercula light with dark spots *M. amamiensis*
 9 Species with reddish chelicerae, prosoma 8.0-11.0mm, receptacula hook-shaped, tubular, with globular initial part. Yaeyama islands*M. gigas*
 9* Distance between anterior spinnerets wider than length of anterior spinnerets. Taiwan*M. simplicata*

Acknowledgements

The present study was partly done as a Monbusho C.O.E. Visiting Foreign Researcher at the Tropical Biosphere Research Center. We are greatly indebted to Prof. Dr. Kiyoshi Yamazato for his constant promotion of research work, and to Prof. Dr. Masao Hoshino, Prof. M. Aramoto, and Assoc. Prof. M. Kinjo for offering their help at the Iriomote Station. Mr. P. Hillyard of The Natural History Museum in London kindly loaned us type material. The manuscript was improved by comments from Prof. F.A. Coyle and Dr. H. Ono. Dr. M. J. Grygier corrected the English text.

References

- Haupt, J. 1983. Vergleichende Morphologie der Genitalorgane und Phylogenie der liphistiomorphen Webspinnen (Araneae: Mesothelae). I. Revision der bisher bekannten Arten. Zeitschrift für Zoologische Systematik und Evolutionsforschung 21: 275-293.
 Haupt, J. 1991. Lebensdauer von mesothelen Spinnen. Bulletin de la Société Neuchâtoise des Sciences Naturelles 116 (1): 113-116.
 Hu, J.L. and Li, F.J. 1986. On two species of *Macrothele* from China (Araneae: Dipluridae). Acta Zootaxonomica Sinica 11: 35-39.
 Ikehara, S. and Shimojana, M. 1975. *Okinawa no Riku no Dobutsu*. (Terrestrial Animals in Okinawa.) Naha: Hudokisha. 143 pp.
 Kayashima, I. 1955. On the Watase's line viewed from the distribution of spiders. Acta Arachnologica 14: 25-28. [in Japanese].
 Okada, Y. (ed.), 1959. *An Annotated List of Animals of Okinawa Islands*. Society of Biological Education of Okinawa. Naha: University of the Ryukyus. 384 pp.
 Ono, T. and Yaginuma, T. 1964. Spiders from Amami-ōshima and Okinoerabushima Islands. Kansai Shizenbunka Kenkyukai Kenkyukoku 1: 31-38. [in Japanese].
 Pocock, R.J. 1901. On some trap-door spiders from China. Proceedings of the Zoological Society of London 1901 (1): 207-215, Pl. XXI.
 Saito, S. 1933. Notes on the spiders from Formosa. Transactions of the Sapporo Natural History Society 13 (1): 32-61, Pl. 3.
 Yaginuma, T. 1986. *Spiders of Japan in Color*. Osaka: Hoikusha Publishing Co. 305 pp.
 Zhu, C.D. and Mao, J.Y. 1983. A new species of spider of the genus *Macrothele* from China (Araneae. Dipluridae). Journal of the Bethune Medical University 9 (suppl.): 133-134.